

WHAT IS CLAIMED IS:

51(3a)

1. A color gamut compression apparatus for converting a source color generated by an information-input apparatus into a target color inside a color gamut reproducible by an information-output apparatus, comprising:
 - a point of convergence computation part for computing a point of convergence for a chromatic color such that the point of convergence has the same hue value as a hypothetical chromatic color that would be reproduced by the information-output apparatus based on a digital signal value for the information-input apparatus corresponding to a color determined by the source color, and lies inside the color gamut of the information-output apparatus;
 - a first point of compression computation part for computing a point of compression such that the point of compression lies on a substantially straight line connecting the point of convergence and the source color, and lies inside the color gamut of the information-output apparatus; and
 - a compression part for converting the source color into the target color corresponding to the point of compression computed by said first point of compression computation part.
2. The color gamut compression apparatus

DO NOT FILE BEFORE 06/01/2010

according to claim 1, wherein said first point of compression computation part computes the point of compression such that the point of compression is at an intersection of the substantially straight 5 line and a boundary of the color gamut of information-output apparatus.

3. The color gamut compression apparatus according to claim 1, further comprising:

10 a point of convergence computation execution determination part for determining whether the source is a chromatic color or an achromatic color;

15 a second point of compression computation part for computing, when said point of convergence computation execution determination part determines that the source color is an achromatic color, the point of compression such that the point of compression lies inside the 20 color gamut of the information-output apparatus and has zero chroma; wherein

25 said compression part converts the source color into a color corresponding to the point of compression computed by said second point of compression computation part.

4. The color gamut compression apparatus according to claim 1, wherein, when a hue value of the source color matches that of any of a 30 predetermined number of representative colors of

0024070-000000000000

the information-input apparatus, said point of convergence computation part computes the point of convergence such that the point of convergence has the same hue value as a hypothetical color

5 reproduced by the information-output apparatus based on a digital signal value corresponding to the matched representative color, lies inside the color gamut of the information-output apparatus and is achromatic; and wherein

10 when the source color is intermediate adjacent representative colors with respect to hue, the point of convergence is computed by linear interpolation of points of convergence corresponding to the adjacent representative

15 colors.

5. The color gamut compression apparatus according to claim 1, wherein, when the hue of the source color lies within a hue range including 20 transitions from the representative color Green to the representative colors Cyan, Blue and Magenta, said point of convergence computation part computes the point of convergence such that the point of convergence has the same hue value as a 25 hypothetical color reproduced by the information-output apparatus based on a digital signal value corresponding to the representative color Blue, lies inside the color gamut of the information-output apparatus and is chromatic

6. The color gamut compression apparatus according to claim 1, wherein, when the hue of the source color lies within a hue range including a transition from the representative color Red to 5 the representative color Yellow, said point of convergence computation part computes the point of convergence such that the point of convergence has the same hue value as a hypothetical color reproduced by the information-output apparatus 10 based on a digital signal value corresponding to the representative color Cyan, lies inside the color gamut of the information-output apparatus and is chromatic.

15 7. The color gamut compression apparatus according to claim 1, wherein, when the hue of the source color lies within a hue range including a transition from the representative color Magenta to the representative color Red, said point of 20 convergence computation part computes a first point of convergence such that the first point of convergence has the same hue value as a hypothetical color reproduced by the information-output apparatus based on a digital signal value 25 corresponding to the representative color Blue, lies inside the color gamut of the information-output apparatus and is chromatic, and
30 said point of convergence computation part computes a second point of convergence such that the second point of convergence has the same

00200700000000000000

hue value as a hypothetical color reproduced by the information-output apparatus based on a digital signal value corresponding to the representative color Cyan, lies inside the color 5 gamut of the information-output apparatus and is chromatic; and wherein

the point of convergence is determined by linear interpolation on a hue scale on a line segment between the first point of 10 convergence and the second point of convergence.

8. The color gamut compression apparatus according to claim 1, wherein, when the hue of the source color lies within a hue range including a 15 transition from the representative color Yellow to the representative color Green, said point of convergence computation part computes a first point of convergence such that the first point of convergence has the same hue value as a 20 hypothetical color reproduced by the information-output apparatus based on a digital signal value corresponding to the representative color Blue, lies inside the color gamut of the information-output apparatus and is chromatic, and 25 said point of convergence computation part computes a second point of convergence such that the second point of convergence has the same hue value as a hypothetical color reproduced by the information-output apparatus based on a 30 digital signal value corresponding to the

002070 0000000000

representative color Cyan, lies inside the color gamut of the information-output apparatus and is chromatic; and wherein

the point of convergence is

5 determined by linear interpolation on a hue scale on a line segment between the first point of convergence and the second point of convergence.

9. The color gamut compression apparatus
10 according to claim 1, wherein said point of convergence computation part computes the point of convergence such that the point of convergence has the same brightness level as one of four values for the hue value which is determined by the
15 source color, the four values being maximum chroma, mean value of the color gamut, gravitational center value of the color gamut and median of the color gamut.

20 10. The color gamut compression apparatus according to 9, wherein said point of convergence computation part computes the point of convergence such that the point of convergence has a hue value C_n satisfying an equation (1) below

25

$$C_n = K_c \times C_{max} \quad (1)$$

where C_{max} indicates one of maximum chroma reproducible by the information-output apparatus
30 for the hue determined by the source color,

DOCUMENT EDITION 60

maximum chroma at the mean value of the color gamut, maximum chroma at the gravitational center value of the color gamut, and maximum chroma at the median of the color gamut, and k_c ($0 < k_c < 1$)

5 indicates an arbitrary parameter.

11. The color gamut compression apparatus according to claim 1, wherein said point of convergence computation part computes an optional point of computation such that the optional point of convergence lies between two intersections formed by a line having the same hue value and same chroma as the point of convergence

A determined according to claim 1 and parallel with a brightness axis and by a boundary of the color gamut of the information-output apparatus, and is determined in accordance with a chroma value of the source color.

20 12. The color gamut compression apparatus according to claim 11, wherein said point of compression computation part computes an optional point of convergence such that the optional point of convergence lies between the

A point of convergence determined according to claim 1 and an achromatic point having the same hue value and same brightness level as the point of convergence determined according to claim 1, and is determined in accordance with a chroma value of

30 the source color.

00200000000000000000000000000000

13. The color gamut compression apparatus according to claim 1, wherein said point of convergence computation part compares a chroma value of the source color with a predetermined chroma value a , and, if the chroma value is equal to or greater than a , the point of convergence determined according to claim 1 is used, and, if the chroma value is smaller than a , said point of convergence computation part computes an optional point of convergence such that the optional point of convergence lies between the point of convergence determined according to claim 1 and an achromatic point having the same hue value and same brightness level as the point of convergence determined according to claim 1, and is determined by the chroma value of the source color.

14. A color gamut compression method for
20 converting a source color generated by an
information-input apparatus into a target color
inside a color gamut reproducible by an
information-output apparatus, comprising the steps
of:

25 computing a point of convergence for a
chromatic color such that the point of convergence
has the same hue value as a hypothetical chromatic
color that would be reproduced by the information-
output apparatus based on a digital signal value
30 for the information-input apparatus corresponding

to a color determined by the source color, and lies inside the color gamut of the information-output apparatus;

computing a point of compression such
5 that the point of compression lies on a substantially straight line connecting the point of convergence and the source color, and lies inside the color gamut of the information-output apparatus; and

10 converting the source color into the target color corresponding to the point of compression computed according to the step of computing the first point of compression.

15 15. The color gamut compression method according to claim 14, further comprising the steps of:

determining whether the source is a chromatic color or an achromatic color;

20 computing, when the source color is determined to be an achromatic color, the point of compression such that the point of compression lies inside the color gamut of the information-output apparatus and has zero chroma; wherein

25 the source color is converted into a color corresponding to the point of compression thus computed.

30 16. The color gamut compression method according to claim 14, wherein, when a hue value

002010-0000000000

of the source color matches that of any of a predetermined number of representative colors of the information-input apparatus, the step of computing the point of convergence computes the 5 point of convergence such that the point of convergence has the same hue value as a hypothetical color reproduced by the information-output apparatus based on a digital signal value corresponding to the matched representative color, 10 lies inside the color gamut of the information-output apparatus and is achromatic; and wherein when the source color is intermediate adjacent representative colors with respect to hue, the point of convergence is computed by linear 15 interpolation of points of convergence corresponding to the adjacent representative colors.

17. The color gamut compression method 20 according to claim 14, wherein, when the hue of the source color lies within a hue range including transitions from the representative color Green to the representative colors Cyan, Blue and Magenta, the step of computing the point of convergence 25 computes the point of convergence such that the point of convergence has the same hue value as a hypothetical color reproduced by the information-output apparatus based on a digital signal value corresponding to the representative color Blue, 30 lies inside the color gamut of the information-

00200000000000000000000000000000

output apparatus and is chromatic.

18. The color gamut compression method according to claim 14, wherein, when the hue of the source color lies within a hue range including 5 a transition from the representative color Red to the representative color Yellow, the step of computing the point of convergence computes the point of convergence such that the point of convergence has the same hue value as a 10 hypothetical color reproduced by the information- output apparatus based on a digital signal value corresponding to the representative color Cyan, lies inside the color gamut of the information- output apparatus and is chromatic.

15

19. The color gamut compression method according to claim 14, wherein, when the hue of the source color lies within a hue range including a transition from the representative color Magenta 20 to the representative color Red, the step of computing the point of convergence computes a first point of convergence such that the first point of convergence has the same hue value as a hypothetical color reproduced by the information- 25 output apparatus based on a digital signal value corresponding to the representative color Blue, lies inside the color gamut of the information- output apparatus and is chromatic, and the step of computing the point of 30 convergence computes a second point of convergence

00200000000000000000000000000000

such that the second point of convergence has the same hue value as a hypothetical color reproduced by the information-output apparatus based on a digital signal value corresponding to the representative color Cyan, lies inside the color gamut of the information-output apparatus and is chromatic; and wherein

the point of convergence is determined by linear interpolation on a hue scale on a line segment between the first point of convergence and the second point of convergence.

20. The color gamut compression method according to claim 14, wherein, when the hue of
15 the source color lies within a hue range including a transition from the representative color Yellow to the representative color Green, the step of computing the point of convergence computes a first point of convergence such that the first
20 point of convergence has the same hue value as a hypothetical color reproduced by the information-output apparatus based on a digital signal value corresponding to the representative color Blue, lies inside the color gamut of the information-
25 output apparatus and is chromatic, and

the step of computing the point of convergence computes a second point of convergence such that the second point of convergence has the same hue value as a hypothetical color reproduced by the information-output apparatus based on a

digital signal value corresponding to the representative color Cyan, lies inside the color gamut of the information-output apparatus and is chromatic; and wherein

5 the point of convergence is determined by linear interpolation on a hue scale on a line segment between the first point of convergence and the second point of convergence.

10 21. A color gamut compression apparatus for converting a source color generated by an information-input apparatus into a target color inside a color gamut reproducible by an information-output apparatus, comprising:

15 a point of convergence computation part for computing a point of convergence for a chromatic color such that the point of convergence has the same hue value as the source color, has the same brightness as one of a maximum chroma 20 color, a mean value of the color gamut reproducible by the information-output apparatus, gravitational center value of the color gamut reproducible by the information-output apparatus, and median of the color gamut reproducible by the 25 information-output apparatus, and lies inside the color gamut of the information-output apparatus;

a first point of compression computation part for computing a point of compression such that the point of compression lies on a 30 substantially straight line connecting the point

00020000-0000-0000-0000-000000000000

of convergence and the source color, and lies inside the color gamut of the information-output apparatus; and

5 a compression part for converting the
source color into the target color corresponding
to the point of compression computed by said first
point of compression computation part.

22. The color gamut compression
10 apparatus according to claim 21, wherein said
first point of compression computation part
computes the point of compression such that the
point of compression is at an intersection of the
substantially straight line and a boundary of the
15 color gamut of information-output apparatus.

23. The color gamut compression apparatus according to claim 21, wherein, when a hue value of the source color matches that of any of a predetermined number of representative colors of the information-input apparatus, said point of convergence computation part computes the point of convergence for a chromatic color such that the point of convergence has the same hue value as the source color, has the same brightness as one of a maximum chroma color, a mean value of the color gamut reproducible by the information-output apparatus, gravitational center value of the color gamut reproducible by the information-output apparatus, and median of the color gamut

reproducible by the information-output apparatus, and lies inside the color gamut of the information-output apparatus; and wherein

5 adjacent representative colors with respect to hue, the point of convergence is computed by linear interpolation of points of convergence corresponding to the adjacent representative colors.

10

24. The color gamut compression apparatus according to claim 21, further comprising:

15 a point of convergence computation execution determination part for determining whether the source is a chromatic color or an achromatic color;

20 a second point of compression computation part for computing, when said point of convergence computation execution determination part determines that the source color is an achromatic color, the point of compression such that the point of compression lies inside the color gamut of the information-output apparatus 25 and has zero chroma; wherein

30 said compression part converts the source color into a color corresponding to the point of compression computed by said second point of compression computation part.

0024070-366088460

25. The color gamut compression apparatus according to 21, wherein said point of convergence computation part computes the point of convergence such that the point of convergence has
5 a hue value C_n satisfying an equation (1) below

$$C_n = K_c \times C_{max} \quad (1)$$

where C_{max} indicates one of maximum chroma
10 reproducible by the information-output apparatus for the hue value of the source color, maximum chroma at the mean value of the color gamut for the hue value of the source color, maximum chroma at the gravitational center value of the color
15 gamut for the hue value of the source color, and maximum chroma at the median of the color gamut for the hue value of the source color, and k_c ($0 < k_c < 1$) indicates an arbitrary parameter.

20 26. The color gamut compression apparatus according to claim 21, wherein said point of convergence computation part computes an optional point of computation such that the optional point of convergence lies between two
25 intersections formed by a line having the same hue value and same chroma as the point of convergence determined according to claim 21 and parallel with a brightness axis and by a boundary of the color gamut of the information-output apparatus, and is
30 determined in accordance with a chroma value of

002010188200000000

the source color.

27. The color gamut compression apparatus according to claim 21, wherein said point of compression computation part computes an optional point of convergence such that the optional point of convergence lies between the point of convergence determined according to claim 21 and an achromatic point having the same hue value and same brightness level as the point of convergence determined according to claim 1, and is determined in accordance with a chroma value of the source color.

28. The color gamut compression apparatus according to claim 21, wherein said point of convergence computation part compares a chroma value of the source color with a predetermined chroma value a , and, if the chroma value is equal to or greater than a , the point of convergence determined according to claim 1 is used, and, if the chroma value is smaller than a , said point of convergence computation part computes an optional point of convergence such that the optional point of convergence lies between the point of convergence determined according to claim 1 and an achromatic point having the same hue value and same brightness level as the point of convergence determined according to claim 1, and is determined by the chroma value of the source color.

002010-8888888888

29. A color gamut compression method for
converting a source color generated by an
information-input apparatus into a target color
inside a color gamut reproducible by an
information-output apparatus, comprising the steps
of:

computing a point of convergence for a chromatic color such that the point of convergence has the same hue value as the source color, has the same brightness as one of a maximum chroma color, a mean value of the color gamut reproducible by the information-output apparatus, gravitational center value of the color gamut reproducible by the information-output apparatus, and median of the color gamut reproducible by the information-output apparatus, and lies inside the color gamut of the information-output apparatus;

computing a point of compression such
20 that the point of compression lies on a
substantially straight line connecting the point
of convergence and the source color, and lies
inside the color gamut of the information-output
apparatus; and

30. The color gamut compression method

நாட்டுப்புறங்கள்

according to claim 29, wherein the step of computing the first point of compression computes the point of compression such that the point of compression is at an intersection of the 5 substantially straight line and a boundary of the color gamut of information-output apparatus.

31. The color gamut compression apparatus according to claim 29, wherein, when a 10 hue value of the source color matches that of any of a predetermined number of representative colors of the information-input apparatus, the step of computing the point of convergence computes the point of convergence for a chromatic color such 15 that the point of convergence has the same hue value as the source color, has the same brightness as one of a maximum chroma color, a mean value of the color gamut reproducible by the information-output apparatus, gravitational center value of 20 the color gamut reproducible by the information-output apparatus, and median of the color gamut reproducible by the information-output apparatus, and lies inside the color gamut of the information-output apparatus; and wherein 25 when the source color is intermediate adjacent representative colors with respect to hue, the point of convergence is computed by linear interpolation of points of convergence corresponding to the adjacent representative 30 colors.

00000000000000000000000000000000

32. The color gamut compression method according to claim 29, further comprising the steps of:

5 determining whether the source is a
chromatic color or an achromatic color;
computing, when the source color is
determined to be an achromatic color, the point of
compression such that the point of compression
10 lies inside the color gamut of the information-
output apparatus and has zero chroma; wherein
the source color is converted into a
color corresponding to the point of compression
thus computed.

15
33. The color gamut compression
apparatus according to 29, wherein the step of
computing the point of convergence computes the
point of convergence such that the point of
convergence has a hue value C_n satisfying an
equation (1) below

$$C_n = K_C \times C_{\max} \quad (1)$$

25 where C_{max} indicates one of maximum chroma
reproducible by the information-output apparatus
for the hue value of the source color, maximum
chroma at the mean value of the color gamut for
the hue value of the source color, maximum chroma
30 at the gravitational center value of the color

gamut for the hue value of the source color, and maximum chroma at the median of the color gamut for the hue value of the source color, and k_c ($0 < k_c < 1$) indicates an arbitrary parameter.

5

34. The color gamut compression apparatus according to claim 29, wherein the step of computing the point of convergence computes an optional point of computation such that the 10 optional point of convergence lies between two intersections formed by a line having the same hue value and same chroma as the point of convergence A determined according to claim 29 and parallel with a brightness axis and by a boundary of the color 15 gamut of the information-output apparatus, and is determined in accordance with a chroma value of the source color.

35. The color gamut compression apparatus according to claim 29, wherein said point of compression computation part computes an optional point of convergence such that the optional point of convergence lies between the A point of convergence determined according to claim 29 and an achromatic point having the same hue 25 A value and same brightness level as the point of convergence determined according to claim 29, and A is determined in accordance with a chroma value of the source color.

30

36. The color gamut compression apparatus according to claim 29, wherein said point of convergence computation part compares a chroma value of the source color with a 5 predetermined chroma value a , and, if the chroma value is equal to or greater than a , the point of convergence determined according to claim 29 is used, and, if the chroma value is smaller than a , said point of convergence computation part 10 computes an optional point of convergence such that the optional point of convergence lies A between the point of convergence determined A according to claim 29 and an achromatic point having the same hue value and same brightness 15 A level as the point of convergence determined A according to claim 1, and is determined by the chroma value of the source color.

00000000000000000000000000000000